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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/504,813	02/16/2000	Shuji Goto	P99,2486	6161

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EXAMINER	
CREPEAU, JONATHAN	
ART UNIT	**PAPER NUMBER**
1746	

DATE MAILED: 04/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/504,813	GOTO ET AL.
	Examiner	Art Unit
	Jonathan S. Crepeau	1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 7-10 and newly added claims 11-17. Claims 7-10 remain rejected for the reasons of record, and claims 11-17 are newly rejected as necessitated by amendment. Accordingly, this action is made final.

Claim Suggestions

2. In claims 11 and 12, the limitations "said electrolyte salt" and "said matrix polymer" lack proper antecedent basis. Correction is suggested but not required.

Claim Objections

3. Claim 13 is objected to because of the following informalities: in line 3, the limitations "-butylolactone, -valerolactone" should be changed to "γ-butylolactone, γ-valerolactone" (see instant specification, page 10). Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. Claims 7-13, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narang et al (U.S. Patent 6,168,885) in view of Schneider et al (U.S. Patent 6,180,281) in view

of Gozdz et al (U.S. Patent 5,840,087) in view of Kawakami et al (U.S. Pre-Grant Publication No. 2002/0064710).

Regarding claims 7 and 17, In Figure 1 and in column 11, lines 4-12, Narang et al. generally teach a process for making a battery comprising the steps of coating a negative electrode with electrolyte (26), coating a positive electrode with electrolyte (36), and laminating the two electrode/electrolyte sheets together under heat (42) so as to form a single, continuous electrolyte. Regarding claims 8, 13, and 16, in column 10, lines 34-55, the reference teaches that the solid polymer electrolyte contains a plasticizer (swelling solvent) such as ethylene carbonate (EC) and dimethylcarbonate (DMC). Regarding claims 8 and 16, in column 11, lines 7 and 8, it is further taught that the electrolyte is gelled. Regarding claims 11 and 16, the electrolyte salt may comprise $LiPF_6$, $LiBF_4$, and $LiAsF_6$, among others (see col. 10, line 23). Regarding claims 12 and 16, the electrolyte matrix polymer is preferably polyvinylidene difluoride (PVDF) (see col. 10, line 34).

The reference does not expressly teach that the electrode/electrolyte sheets are wound in the lengthwise direction of the sheets (i.e., that the laminate is spirally-wound), or that the electrolyte layers are formed into a "seamless" layer, as recited in claims 7 and 17. The reference further does not expressly teach that both sides of each electrode are coated with electrolyte (claims 7 and 17), or the temperature or duration of the lamination (claims 9 and 10).

The patent of Schneider et al. is generally directed to composite separator and electrode structures comprising seamless interfaces between the separator and electrodes (see abstract).

The patent of Gozdz et al. is directed to methods of making laminated batteries. As shown in Figure 6, an electrode (67) is coated on both sides with electrolyte material (64) prior to

lamination. Gozdz et al. further teach a lamination temperature of about 100-120 degrees C in column 5, lines 52-55.

The publication of Kawakami et al. is directed to rechargeable lithium batteries (see paragraph 82). In paragraph 141, the reference teaches that the batteries can be spirally-wound.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Schneider et al. to form the electrolyte layers of Narang et al. into a "seamless" layer. In column 6, line 30 et seq., Schneider et al. teach that "the interfaces between the advancing polymer boundaries having merged to lose completely any independent identity. The resulting structure is very pliant, translucent, and smooth, but extraordinarily strong, as shown in the Examples." The reference further teaches in column 2, line 65 et seq. that "the resultant composite allows ions to freely migrate from the electrode domain through the separator domain during successive charging and discharging of the battery." Accordingly, these teachings of Schneider et al. would motivate the artisan to form a "seamless" interface between the electrolyte layers of Narang et al.

Regarding the limitation that the electrodes are wound, the disclosure of Kawakami et al. would motivate the artisan to wind the electrodes of Narang et al. In paragraph 141, Kawakami et al. teach that "[i]n the case where the rechargeable battery is shaped in a spiral-wound cylindrical form, the anode, separator and cathode are arranged in the named order and they are spiral-wound and because of this, there are provided advantages such that the battery area can be increased as desired and a high electric current can be flown upon operating the charging and discharging." It is further noted that Narang et al. teach in column 3, line 17, in a discussion of

the prior art, that "[o]ften, the various cells are spiral wound before being provided with a protective coating." Accordingly, the artisan would be motivated by these disclosures, particularly that of Kawakami et al., to wind the electrodes of Narang et al.

Regarding the limitation in claims 7 and 17 that both sides of both electrodes are coated with electrolyte, the artisan would be sufficiently motivated to perform this step with the electrodes of Narang et al. Narang et al. teach at column 11, line 9 that "as many layers as necessary can be laminated together to provide the desired capacity of the final electrochemical cell." This disclosure clearly indicates that both sides of each electrode may be coated (to result in, for example, a stacked cell configuration). Furthermore, as noted above, the artisan would be sufficiently motivated to use a spirally-wound configuration with the electrodes of Narang et al. In order to achieve such a configuration, the artisan would understand that an electrically insulating material would have to present on both sides of each electrode in order to prevent a short circuit. In view of Narang's teaching of multi-layer cells above, the coating of electrically insulating, ion-conductive electrolyte material on both sides of each electrode would be an obvious way of eliminating such a short circuit. The artisan could further look to the patent of Gozdz et al., which, as noted above, teaches a double-sided electrolyte coating on an electrode in Figure 6. In column 6, line 39, Gozdz et al. teach that "prior to assembly and lamination at step (c), carrier films 62 are removed (not shown) to expose the unblemished surfaces of facing separator/electrolyte layers 64, 64 which may then be laminated under reduced temperature and pressure conditions to effect a homogeneous, cohesive bond completing battery cell 50." Thus, it is noted that Gozdz et al. also teach a "seamless" bond in addition to a double-sided electrolyte coating.

Regarding the temperature and time limitations recited in claims 9 and 10, as noted above, Gozdz et al. teach a lamination temperature of about 100-120 degrees C, which overlaps with Applicant's claimed range of 70 to about 100 degrees. Accordingly, Applicant's claimed range would be rendered obvious by the disclosure of Gozdz et al. Further, the recitation of heat treatment "for ten minutes" is also not considered to distinguish over the references. The artisan would possess sufficient skill to manipulate the duration of the heat treatment in order to affect the characteristics of the resulting electrolyte bond while at the same time being mindful to not damage other battery components by excessive exposure to heat.

5. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narang et al. in view of Schneider et al. in view of Gozdz et al. in view of Kawakami et al. as applied to claims 7-13, 16, and 17 above, and further in view of Oliver et al (U.S. Patent 5,688,293).

Regarding claims 14 and 15, Narang et al. teach that the sealing and charging steps of the battery may be "conventional" (see col. 11, line 12). However, the reference does not expressly teach that the electrodes are inserted into a film pack (claim 14), or that the electrolyte layers are integrated with each other after being inserted into the film pack (claim 15).

Oliver et al. is directed to a method of making a gel electrolyte battery. In column 5, line 22 et seq. and in each Example, the reference teaches that discrete cells are packaged between metal foil laminate sheets to enclose the cell, and then the battery is exposed to a compression and heating step so as to seal the package and cure (gel) the battery cell.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the packaging and heating steps of Oliver in the process of Narang et al. First, as noted above, Narang et al. teach that the battery can be made in a "conventional" manner. Additionally, the sealing of the package and the curing (gelling) of the electrolyte of Oliver are combined into one step. The artisan would realize that, applied to the process of Narang, this step would result in a time and energy savings in making the battery. Thus, the artisan would be motivated to use this step in the process of Narang.

Response to Arguments

6. Applicant's arguments filed February 4, 2004 have been fully considered but they are not persuasive. Applicants state that "Narang et al. discloses heating a polymer electrolyte and then applying the heated polymer electrolyte to an electrode, but fails to disclose subjecting a wound electrode to heat treatment. (See col. 10, lines 42-55.)." However, the Examiner maintains that it would have been obvious to a person of ordinary skill in the art to use a wound electrode structure in the battery of Narang. As stated above, Kawakami teaches that winding increases the battery interfacial area and allows for a high current to flow therethrough. Thus, it is still believed that it would have been obvious to subject a wound electrode structure to the heat treatment step (42) of Narang.

With regard to the Schneider et al. reference, Applicants assert that this reference is concerned with the union of a separator and an electrode and is not concerned with solid

electrolyte layers. While the Examiner generally concurs with this assertion, it is still believed the Schneider reference is analogous because its teachings regarding the strength of a seamless polymer boundary would be applicable to any polymer boundary. As such, it is still believed that an artisan would be motivated by these teachings to make the electrolyte of Narang "seamless."

Finally, with regard to the Gozdz reference, as noted above, this reference teaches a "homogeneous, cohesive bond" between laminated electrolyte layers. While the term "seamless" is not used, the language of Gozdz clearly indicates that the electrolyte layers are joined by such a seamless bond. Therefore, contrary to Applicant's assertions, it is believed that the Gozdz reference, as well as the other applied references, fairly suggest the claimed invention, and accordingly, the rejection under 35 USC §103 is maintained.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

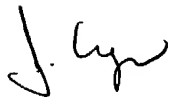
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Patent Examiner
Art Unit 1746
April 11, 2004